

# **COLLINS**

DICTIONARY OF

# **BIOLOGY**

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## COHESIVE ENDS

cohesive ends or 'sticky' ends overlapping COMPLEMENTARY single strands at the termini of double-stranded DNA molecules that can stick the two ends of the molecule (or the ends of different molecules) together by COMPLEMENTARY BASE PAIRING. Cohesive ends are often generated by digesting DNA molecules with the same RESTRICTION ENZYME. Cohesive ends provide a means of sticking insert DNA to VECTOR in the construction of recombinant cloning vectors for GENE CLONING. See Fig. 113.

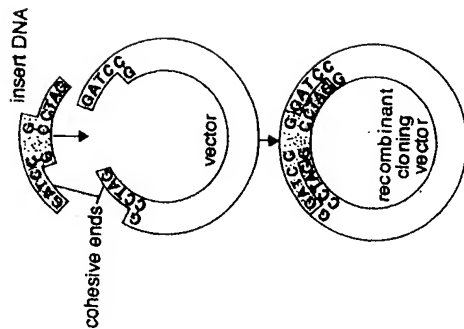


Fig. 113. Cohesive ends. Formation of recombinant cloning vector using cohesive ends.

cohort a group of organisms in a population all of which are the same age. coincidence, coefficient of the proportion of double recombinant types observed in a progeny as compared to the number expected. A value less than 1.0 indicates that CHROMATID INTERFERENCE has taken place. cointegrate the product generated when one REPLICON fuses with another. This may be mediated by TRANSPOSABLE GENETIC ELEMENTS, which the act of copulation between male and female animals during coitus is transferred from male to female.

colchicine a poisonous alkaloid extracted from the corms of the crocus *Colchicum autumnale* that acts as a spindle inhibitor during NUCLEAR DIVISION and can thus be used to produce cells with double sets of chromosomes, due to NONDISJUNCTION. Mitosis is halted at the METAPHASE stage of division when the chromosomes are shortest and thickest. Colchicine is used routinely in the preparation of a KARYOTYPE. cold-blooded see POIKILOTHERM.

## COLLAR CELL

cold receptor a sensory structure that responds particularly to cold and sometimes to pressure. Such receptors occur in the skin of vertebrates, and in humans are more abundant and occur more superficially than warm receptors. Fibres from cold receptors are active between 10° and 40°C with a maximum firing frequency between 20° and 34°C.

Coleoptera an order of insects, including beetles and weevils. The forewing is thick, leathery and veinless, and is called an elytrum. When closed, elytra meet along the midline and protect the membranous hindwings, which fold forward. Some of the approximately 280 000 species of Coleoptera are wingless, however. There is a complete METAMORPHOSIS. See Fig. 114.

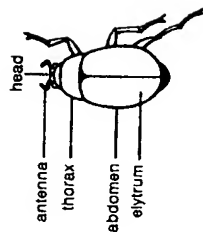


Fig. 114. Coleoptera. Generalized structure.

coleoptile a nonchlorophyllous protective covering over the growing shoot (PLUMULE) of young plant seedlings in certain MONOCOTYLEDONS (e.g. oats) that is the first structure to break through the soil into the air after germination. As growth proceeds the coleoptile is ruptured by the first foliage leaf of the enclosed shoot. Oat coleoptiles have been used extensively in experiments with AUXINS.

coleorhiza a structure similar to the COLEOPTILE but located around the radicle of young seedlings.

coliform (of Gram-negative rod bacteria) normally inhabiting the colon, e.g. *Escherichia coli*, *Enterobacter aerogenes*, *Klebsiella*. See GRAM'S STAIN.

colinearity the linear relationship between a piece of DNA coding (a CISTRON) and the POLYPEPTIDE CHAIN (see Fig. 115). Therefore:

$$\begin{array}{l} \text{A to X} = \text{C to Y} \\ \text{A to B} = \text{C to D} \end{array}$$

collagen a fibrous protein that forms the white fibres of vertebrate CONNECTIVE TISSUE. These have a high tensile strength, e.g. tendons, but are not elastic. Collagen tissues consist of a glycoprotein matrix containing densely packed collagen fibres. These consist of three POLYPEPTIDE chains coiled round each other to form a triple helix, joined by hydrogen bonds.

collagenoblast a type of FIBROBLAST giving rise to COLLAGEN. collar cell see CHOANOCYTE.

## GANOID

structures are usually well-developed in the head region. In vertebrates, ganglia are found in the PERIPHERAL nervous system and the AUTONOMIC NERVOUS SYSTEM.

**ganoid** (of fish) possessing ganoid scales, typified by a hard shiny layer of ganoin (an enamel-like substance) and the fact that they increase in thickness by adding layers all round, ganoin above, laminated from below. Compare COSMOID, PLACOID.

**gangrene** death or decay of a body part due to poor blood circulation, sometimes involving bacterial infection such as *Clostridium perfringens* with release of gas.

**Garrod, Archibald E.** (1857-1936) English hospital physician who between 1900 and 1910 described the first demonstrable case of a human disease that is inherited according to the laws of MENDELIAN GENETICS. The condition is *alkaptonuria*, which is controlled by a single autosomal recessive gene. Garrod proposed that the enzyme that catalyses the breakdown of homogentisic acid to acetoacetic acid is nonfunctional in alkaptonurics. This results in a build-up of the acid in the urine, which turns black on exposure to air, and is readily observed in infant's nappies. It was not however, until 1958 that the absence of a functional homogentisic-acid oxidase enzyme was demonstrated in the liver of a patient with alkaptonuria. Garrod went on to explain several other human conditions such as ALBINISM as INBORN ERRORS OF METABOLISM.

**gas analysis** a comparison of expired respiratory air with atmospheric air. In, for example, a resting human being at sea level, oxygen constitutes only 16.4% of expired respiratory air (20.95% in atmospheric air), carbon dioxide 4.1% (0.04 in atmosphere) and nitrogen 79.5% (79% in atmosphere).

**gas bladder** see AIR BLADDER.

**gas carriage** see GAS EXCHANGE.

**gas exchange** or **gas carriage** the transfer of gases between an organism and the environment. In RESPIRATION, oxygen is taken in and carbon dioxide given out. Photosynthesis in plants complicates this system in that during the process carbon dioxide is required by the plant and oxygen given off (see COMPENSATION PERIOD). In plants and small animals such as PROTOZOANS and PLATYHELMINTHS, gas exchange occurs by DIFFUSION. In higher animals, special respiratory surfaces have been developed, for example, internal and external gills, lungs and trachea.

**gas loading** see GAS EXCHANGE, OXYGEN DISSOCIATION CURVE.

**gasteropod** or **gastropod** any member of the class Gasteropoda in the phylum Mollusca, including MOLLUSCS such as slugs, snails, pteropods, limpets, winkles, whelks and sea slugs. Some forms lack a shell, but where a shell is present it is in the form of a single valve, often spiral. Marine, freshwater and terrestrial forms occur, and there is usually a distinct head, bearing a pair of tentacles and eyes.

**gastric** of, or relating to, the stomach.

## GEL ELECTROPHORESIS

**gastric gland** any gland in the stomach wall that produces components of the GASTRIC JUICE.

**gastric juice** the fluid secreted by glands of the stomach, containing PEPSIN, RENNIN, and hydrochloric acid.

**gastric mill** a structure in the proventriculus or stomach of CRUSTACEANS, formed of a series of cuticular teeth which assist in breaking down food.

**gastrin** a hormone produced by gastrin cells of the pyloric gland, which induces gastric secretion.

**gastrocnemius** the largest muscle of the calf in the human leg.

**gastroenteritis** an inflammation of the intestinal tract, resulting in diarrhoea, vomiting and nausea.

**gastrointestinal tract** see ALIMENTARY CANAL.

**gastrolith** a mass of CALCAREOUS material occasionally found in the proventriculus of crustaceans. It is probably formed as a result of calcium withdrawal from the exoskeleton prior to moulting.

**gastropod** see GASTROPOD.

**gastrotrich** any minute aquatic multicellular animal of the phylum Gastrotricha, comprising unsegmented, worm-like organisms whose locomotion is brought about by epidermal cilia. They have some affinities with ROTIFERS and NEMATODES.

**gastrozooid** a feeding polyp in colonial COELENTERATES.

**gastrula** a stage in embryonic development in which the BLASTULA has invaginated, so giving rise to a two-layered embryo by a process of gastrulation. See ARCHENTERON.

**gastrulation** the process by which the BLASTULA forms the GASTRULA.

**Gause's Law** a law stating that no two species with identical ecology can exist together in the same environment. It is named after the German anatomist G.F. Gause.

**Gaussian curve** see NORMAL DISTRIBUTION CURVE.

**G banding** a method of treating chromosomes with Giemsa stain to show areas of the chromosomes with light and heavy staining. Such patterns are different for each chromosome type and thus are most useful when arranging chromosomes in KARYOTYPE analysis.

**gel** a semi-rigid COLLOID as distinct from the more liquid SOL.

**gelatin** denatured collagen which forms a transparent jelly-like substance.

**gelatinous** jelly-like.

**gelding** see EMASCULATION.

**gel electrophoresis** ELECTROPHORESIS in a gel matrix, commonly agarose or polyacrylamide. This technique allows molecules to be separated on the basis of charge-to-size ratio, using the gel as a support and a sieving material. For example, sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE) can be used to separate PROTEINS, and agarose or polyacrylamide gel electrophoresis (PAGE) to separate NUCLEIC ACIDS.